Seasonal water mass analysis for the Straits of Juan de Fuca and Georgia

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A quantitative analysis of water masses in the coastal waters of southern British Columbia is performed with the Optimum Multiparameter Analysis (OMP) method that optimizes the use of a hydrographic data set by solving an overdetermined linear set of mixing equations. The method is applied to a seasonal data set collected over 5 years in the Strait of Georgia, a large semi-enclosed coastal basin, as well as in Juan de Fuca Strait, its main connection to the Pacific Ocean. Abundant freshwater discharge into the coastal estuary forces an estuarine exchange with oceanic shelf water. Six water characteristics of five source water types are used to obtain mixing proportions over the estuary for each of the four seasons. The model results are found to corroborate with known aspects of the local dynamics such as the presence of a deep shelf inflow into Juan de Fuca Strait and of the Columbia River plume in winter at the mouth of the strait. The analysis also quantifies lesser known features of the region, such as the characteristics of the mid-depth intrusions within the Strait of Georgia and the marked effect of remineralization on nutrient distributions in the deep water of the coastal basin.